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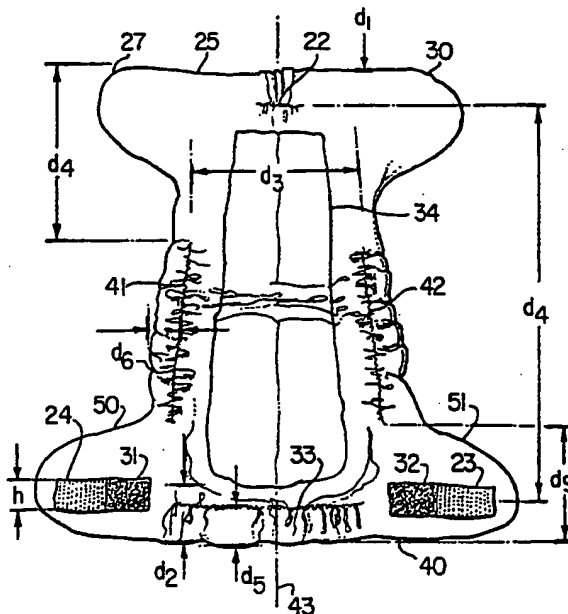
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<p>(21) International Application Number: PCT/CA90/00008 (22) International Filing Date: 3 January 1990 (03.01.90) (30) Priority data: <table border="0"> <tr> <td>587,612</td> <td>5 January 1989 (05.01.89)</td> <td>CA</td> </tr> <tr> <td>293,928</td> <td>5 January 1989 (05.01.89)</td> <td>US</td> </tr> <tr> <td>607,964</td> <td>10 August 1989 (10.08.89)</td> <td>CA</td> </tr> <tr> <td>2,001,823</td> <td>27 October 1989 (27.10.89)</td> <td>CA</td> </tr> <tr> <td>435,701</td> <td>13 November 1989 (13.11.89)</td> <td>US</td> </tr> <tr> <td>2,004,463</td> <td>1 December 1989 (01.12.89)</td> <td>CA</td> </tr> <tr> <td>2,006,265</td> <td>20 December 1989 (20.12.89)</td> <td>CA</td> </tr> </table> (71) Applicant: WORLDWIDE BABY BASICS INFANT WEAR LTD. [CA/CA]; 491 Pacific Boulevard, Vancouver, British Columbia V6B 5G6 (CA).</p>		587,612	5 January 1989 (05.01.89)	CA	293,928	5 January 1989 (05.01.89)	US	607,964	10 August 1989 (10.08.89)	CA	2,001,823	27 October 1989 (27.10.89)	CA	435,701	13 November 1989 (13.11.89)	US	2,004,463	1 December 1989 (01.12.89)	CA	2,006,265	20 December 1989 (20.12.89)	CA	<p>(72) Inventors: COSENS, Calvin, B. ; 2796 Queensbridge Drive, Burnaby, British Columbia V5B 3T8 (CA). BROWNLEE, James, R. ; 2850 Rosebery Avenue, West Vancouver, British Columbia V7V 3A4 (CA). LASBY, William, E. ; 3494-140th Street, Surrey, British Columbia V7A 4J7 (US). (74) Agent: UREN, John, R.; Russell & DuMoulin, 1700 - 1075 West Georgia Street, Vancouver, British Columbia V6E 3G2 (CA). (81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent).</p>
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(54) Title: BABY DIAPER



(57) Abstract

A baby diaper has a forward portion, a rearward portion and attachment tabs mounted on opposite sides of both the forward and rearward portions. An expansion means in the form of elastic material is mounted on the forward portion between the oppositely located tabs on the forward portion and substantially centrally of the tabs to thereby allow for stomach movement of the infant and to create a connection between the tabs which has greater integrity. Additional elastic material is mounted in the central area between the forward and rearward portions which is pretensioned to allow for the diaper to assume a cup shape when it is unrestrained prior to positioning the diaper on an infant.

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5 This invention relates to a baby diaper and, more particularly, to a baby diaper which utilises fastening systems allowing increased comfort to the baby and greater integrity in the diaper connections.

There are many diapers available for use on infants, such
diapers being of the reusable or disposable type. Many of
the diapers so available contain certain features which are
intended to increase the comfort or utility of the diaper.

One such diaper is disclosed in U.S. Patent 4,568,342 to Davis. Davis teaches a diaper which is intended to have greater utility during washing. Davis uses VELCRO (Trademark) as a fastening means, with two VELCRO tabs being mounted on opposite sides of the rearward portion of the diaper and a complementary single long piece mounted on the forward portion of the diaper. When the diaper is positioned on an infant, the rear tabs hook hold to the forward long piece on opposite sides of the front portion and keep the diaper positioned on the infant.

While the attachment technique used in Davis allows for easy positioning of the diaper on the baby, there is no expansion or elasticity in the forward portion of the diaper after the diaper has been attached on the infant. Since the stomach of the infant is accordingly restrained, it can be potentially uncomfortable.

SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided a diaper for an infant comprising a forward portion, a rearward portion connected to said forward portion, attachment means positioned on opposite sides of said forward and rearward portions and expansion means positioned between said attachment means on said forward portion.

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According to a further aspect of the invention, there is provided a diaper for an infant comprising a forward portion, a rearward portion and expansion means mounted in the central portion of said forward and rearward portions, said expansion means being under a predetermined tension such that said diaper forms a cup shape in its non-fitted position.

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According to yet a further aspect of the invention, there is provided a fastener cover for a diaper comprising a first hook portion mounted to the fabric of said diaper about the periphery of said hook portion, a second loop portion mounted separately from and adjacent to said hook portion, said loop portion being connected to said fabric along a connection axis on one side of said loop portion nearestmost to said hook portion, said second loop portion being operable to rotate about said connection axis to cover and connect with said hook portion.

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According to yet a further aspect of the invention, there is provided a diaper comprising at least two layers of fabric material and a plurality of elastic portions to conform the shape of said diaper more closely to the shape of the user of said diaper, at least one of said elastic portions being connected to said diaper and contacting only the outside surface of said two layers of fabric.

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According to yet a further aspect of the invention, there is provided a diaper comprising a forward portion, a rearward portion connected to said forward portion, attachment means positioned on opposite sides of said forward and rearward portions, said attachment means comprising a loop portion on the forward portion of said diaper and a hook portion on the rearward portion of said diaper, said hook portion being made from an extruded plastic material and being operable to contact and fasten to said loop portion.

According to yet a further aspect of the invention, there is provided an absorbency pad for a diaper comprising a first layer of needled fabric material having a first side in which the needle has entered said material and a second side in which the needle has penetrated from said first side, said pad further having a second layer of needled fabric material having a first side in which said needle has entered said material and a second side in which said needle has penetrated from said first side, said second side of said first layer being connected to said second side of said second layer.

According to yet a further aspect of the invention, there is provided a method of constructing an absorbent pad comprising the steps of positioning a first piece of fabric material having first and second sides in contact with a second piece of fabric material having first and second sides, said first sides being in contact, said first side of each of said pieces of material being the side entered initially by the needles in a sewing process.

According to yet a further aspect of the invention, there is provided a diaper comprising a forward portion, a loop section connected to said forward portion, a rearward portion connected to said forward portion, said rearward portion including a wing extending outwardly on each side of

said rearward portion and being operable to be positioned over said loop section of said forward portion, a hook mounted on each of said wings, said hook comprising an inside and an outside section, said inside section being
5 connected to said rearward portion of said diaper and said outside section not being attached to said rearward portion of said diaper.

According to yet a further aspect of the invention, there
10 is provided a diaper comprising a forward portion, a rearward portion connected to said forward portion and including a wing extending outwardly on each side of said rearward portion, a hook and a loop mounted adjacent to each other on each of said wings, each of said hooks being
15 operable to fold over each of said loops, each of said loops being mounted inside each respective hook and a space between each of said hooks and respectively mounted loops, said space being operable as a fold line when each of said hooks is folded over said respective loop.

20 According to yet a further embodiment of the invention, there is provided a fastener for a reusable diaper having forward and rearward portions, said fastener being operably mounted on sides of said rearward portion of said diaper,
25 said fastener comprising a pocket and a tongue movable between extended and unextended positions and mounted within said pocket, said tongue being biased so as to return to said pocket in said unextended position.

30 According to still a further aspect of the invention, there is provided a diaper cover for a reusable diaper comprising a rearward portion, a forward portion attached to said rearward portion, tabs extending outwardly from opposite sides of said rearward portion, means for
35 attaching said tabs to said forward portion and means for retaining a diaper in said diaper cover.

According to yet a further aspect of the invention, there is provided a diaper comprising a forward portion, a rearward portion connected to said forward portion, a leg piece having a curved periphery and being connected on opposite sides of said forward and rearward portions along a connection seam having a first length, the length of said curved periphery of said leg piece along said connection seam being of a second length, said second length being longer than said first length so that a cup shape is formed by said forward and rearward portion in the central area adjacent said connection seam between said forward and rearward portions and said leg pieces.

According to a further aspect of the invention, there is provided a diaper comprising a forward portion, a rearward portion connected to said forward portion, flaps extending outwardly on both sides of said rearward portion for being retained within a diaper cover, said flaps having a hinge line wherein the most outwardly portion of said flap is foldable over the more inwardly portion of said flap.

According to a further aspect of the invention, there is provided a diaper comprising two outside layers of material and at least one inside layer of material, one of said outside layers of material being cotton, the other of said outside layer being polyester sheeting and the inside layer being a polyrayon blend material.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example only, with the use of drawings in which:

Figure 1 is an isometric view of a diaper according to the invention in a fastened position;

Figure 2 is a side view of the diaper of Figure 1 in an unfastened and unrestrained position ready for fitting to an infant;

5 Figure 3 is a plan view of the diaper of Figure 2 according to the invention;

10 Figure 4 is a view of the forward portion of the baby diaper according to the invention;

Figure 5 is a view of a typical tab used to fasten the diaper;

15 Figure 6 is a partial view of the inside back portion of the diaper according to the invention in a further embodiment;

20 Figure 7 is a diagrammatic partial side view of the diaper of Figure 6;

Figure 8 is a view of the outside of the diaper according to the invention in a further embodiment;

25 Figure 9 is an enlarged side view of the extruded portion of the fastener in a further embodiment of the invention;

30 Figure 10 is a diagrammatic view of the method of manufacturing the rayon wear pad of the diaper in a further embodiment according to the invention;

Figure 11 illustrates the needling or sewing process on the material prior to the material becoming part of the rayon fabric used for the wear strip of the diaper;

35 Figure 12 is a diagrammatic partial view of the inside back portion of the diaper similar to Figure 6 but

illustrating a further embodiment according to the invention;

5 Figure 13 is a diagrammatic partially sectional view of the diaper particularly illustrating the overlapping hook and loop sections when the diaper is being worn;

10 Figure 14 is a diagrammatic partially sectional view illustrating the overlapping hook and loop sections when the diaper is being prepared for washing;

Figure 15 illustrates a fastener for a diaper in a further embodiment of the invention;

15 Figures 16A and 16B are diagrammatic and enlarged views of the fastener of Figure 15 illustrating its operation in use;

20 Figures 17A and 17B are front and back views, respectively, of a diaper cover according to a further aspect of the invention;

25 Figures 18A and 18B are front and side views, respectively, of a commercial type diaper according to a further aspect of the invention;

Figure 19 is a view of the commercial diaper of Figure 18 installed in the diaper cover of Figure 17 according to the invention; and

30 Figure 20 is a view of a marker used for cutting and obtaining the material used for the diaper of Figure 18.

35 Figure 21 is a diagrammatic view of a proposed layered construction for the commercial type diaper according to a further aspect of the invention.

DESCRIPTION OF SPECIFIC EMBODIMENT

Referring now to the drawings, a baby diaper is generally illustrated at 10 in Figure 1. It includes a forward portion 11, a rearward portion 12, two wing portions 13, 14 which extend outwardly from the rearward portion 12. The diaper 10 is made from two layers of cotton material which are sewed together with elastic and a rayon absorbent pad mounted therebetween as described in greater detail hereafter.

The forward portion 11 of the diaper 10 includes two VELCRO tabs 20, 21 affixed to the diaper 10 in the normal manner by stitching. A piece of elastic 22 is stitched into the fabric of the diaper 10 between the layers and directly between the VELCRO tabs 20, 21 and not overlapping with the tabs 20, 21.

As best seen in Figure 4, the elastic 22 is centred between the tabs 20, 21 so that the elastic 22 pulls the tabs 20, 21 together directly in the centre of the tabs 20, 21 thus creating a minimal moment on the connection which exists between the tabs 20, 21, 23, 24 when the diaper 10 is fastened on an infant and thus allowing greater connection strength and integrity than would otherwise be the case if the elastic 22 was offset mounted such that a moment was created between the tabs 20, 21. The tabs 20, 21 are also of a size that, when connected to the complementary VELCRO tabs 23, 24 on the rearward portion 12 of the diaper 10, the tabs will not buckle while in use. That is, the tabs 20, 21, 23, 24 will remain flat and will not fold. The tabs 23, 24, are hook tabs and they are located outwardly of the rearward portion. The protect tabs 31, 32 are loop pads and they are positioned inwardly of the hook tabs 23, 24.

A distance of approximately $3/4$ inch as shown is left between the top of the tabs 20, 21 and the upper side 25 of the forward portion 11 of the diaper 10. This distance is

designed to allow forward movement of the infant without discomfort to the stomach when the infant reaches forward or sits down. The cotton fabric of the diaper 10 is designed to fold over the tabs 20, 21 in this instance thus
5 protecting the stomach of the infant against abrasion.

Two VELMATE protect tabs 31, 32 extend sidewise from the tabs 23, 24 and are connected thereto. The protect tabs 31, 32 are adapted to be folded over the tabs 23, 24,
10 respectively, when the diaper 10 is being washed without the necessity of also folding over the flaps 50, 51. This prevents the tabs 23, 24 from catching with other clothes in a washing machine.

15 In order to cover the protect tabs 31, 32, when the diaper 10 is in use, two flaps or wing pieces 27, 30 are connected to and extend sidewise from the forward portion 11 of the diaper 10 as best seen in Figure 4. At the widest fitting of the diaper 10, it is possible that the tabs 31,
20 32 could be positioned against the skin of the infant without being covered. Thus, the flaps 27, 30 which extend outwardly from the end of the tabs 20, 21 act to protect the infant in this eventuality as they will cover the protect tabs 31, 32 in all cases.

25 Reference is again made to Figure 3. A second elastic portion 33 is sewed between the two layers of fabric of the diaper 10 and is positioned between the protect tabs 31, 32. The distance "d5" of the elastic portion 33 from the top 40 of the rearward portion 12 of the diaper is approximately 1 1/4". The VELCRO tabs 24, 23 and the protect tabs 31, 32 suitably have a dimension "h" as shown of approximately 1". This width allows the elastic portion 33 is be mounted in the centre of the height "h" which, as described above,
35 allows a minimal moment to be exerted when the tabs 23, 24 are connected to the front tabs 20, 21. A rayon absorbent strip 34 having a thickness of approximately 1/2" to 5/8" is

sewed between the two layers of the diaper 10. A dimension "d1" of 2 1/4" between the end of the rayon wear strip 34 and the top of the diaper 10 has been found suitable to allow connections of the tabs 20, 21, 23, 24 without interfering with the rayon strip 34. A dimension "d2" of 2 3/4" between the end of the rayon absorbent strip 34 and the upper side 40 of the rearward portion 12 of the diaper 10 has been found satisfactory to allow unobstructed flexibility for the elastic portion 33 and provides a fit where the rayon wear pad 34 does not stick out if it were located closer to the top 40 of the rearward portion 12 of the diaper 10. It further allows a comfortable taper fit of the diaper 10 to the infant.

Elastic portions 41, 42 are also mounted to the diaper 10 on opposite sides of the longitudinal axis 43 in the central area. These elastic portions 41, 42 are mounted a distance "d3" of approximately 5". Such a dimension and the elastic portions 41, 42 allow a snug and comfortable fit of the diaper 10 to the infant and assist to reduce the drooping of the diaper 10 between the legs of the infant.

A distance "d4" of approximately 5 1/2" is the distance from the upperside 25 of the forward portion 11 of the diaper 10 to the beginning of the elastic portions 41, 42. Such a distance will allow non-interference of the diaper 10 with the top of the VELCRO tabs 20, 21. Further, the distance "d4" allows the tabs 20, 21 (Figure 4) to be connected to the tabs 23, 24 without the elastic portion 41, 42 acting to separate the connecting pieces and, thereby, will similarly allow a greater connection integrity to the diaper 10 when it is fastened on the infant.

As viewed best in Figure 2, the diaper 10 has a cupping action when it is in a rest position prior to positioning the diaper 10 on an infant. This action allows for easy placement of the diaper 10 relative to the infant on which

the diaper 10 is to be fastened and reduces the necessity for excessively moving either the infant or the diaper to obtain the proper and comfortable fit. In addition, since the rearward portion 12 and the forward portion 11 of the diaper 10 are closer together, it takes less time to remove and install the diaper 10 on the infant.

The cupping action illustrated best in Figure 2 is achieved by the dimensions of the elastic material ($3/8$ " wide) the distance "d6" ($1\ 1/8$ ") of the elastic 41, 42 from the outside of the diaper 10 and the distance from both upper sides 25, 40. The distance "d7" of the elastic 41, 42 from the upper side 40 of the rearward portion 12 is approximately 4". The distance "d4" of the elastic 41, 42 from the upper side 25 of the forward portion 11 is approximately $5\ 1/2$ ". The elastic portions 41, 42 are put under a predetermined tension when they are embedded between the cotton layers of the diaper 10. This pretension of the elastic is obtained by lying the diaper flat and by then installing an elastic portion of known length over a known length on the fabric of the diaper 10. A distance of the elastic of 5" and a distance of the fabric of $9\ 1/2$ " has been found to allow the formation of the appropriate cupping action of the diaper 10. The distance "d8" between the elastic portion 22 of the forward portion 11 and the elastic 33 of the rearward portion 12 is approximately $12\ 1/2$ ".

Each of the VELCRO attachment tabs 20, 21, 23, 24, 31, 32 have rounded corners as best seen in Figure 5 where a typical tab is generally illustrated at 44. This tab 44 with its rounded corners allows for the absence of the otherwise sharp corners which are inherent in attachment tabs of the VELCRO type. The rounded corners reduce the risk of sharp edges coming into contact with the infant.

OPERATION

5 In operation, an infant will be positioned on the diaper 10, the diaper 10 being in the positions best illustrated in Figures 2 and 3; that is, the diaper 10 will have the cupping rest position illustrated in Figure 2 due to the position of the elastic portions 41, 42 on the diaper 10.

10 The front portion 11 of the diaper 10 will be snugly placed against the stomach of the infant and the flaps 50, 51 of the rearward portion 12 will be raised with the attached tabs 23, 24. The flaps 50, 51 will be brought into contact with the forward portion 11 of the diaper 10 until the tabs 23, 24 contact and attach to tabs 20, 21 on the formed portion 11 in a snug and comfortable fit on the infant. It will be noted that in such an attached position as viewed in Figure 1, the flaps 27, 30 of the forward portion 11 of the diaper 10 will overlap with the protect tabs 31, 32 so as to prevent contact of these tabs with the infant. In positioning the diaper 10 on the infant, the elastic portion 33 in the rearward portion 12 of the diaper 10 will expand as necessary allowing the tabs 23, 24 to reach the correct attachment position relative to the tabs 20, 21 on the forward portion 11 of the diaper 10.

25 When the stomach of the infant moves, the movement will be accommodated by the elastic 22 in the forward portion of the diaper 10. This movement, assuming an outwardly movement of the stomach of the infant, will result in a force being exerted on the connection between the tabs 20, 21 and the tabs 23, 24. This force, however, will be a shear force only and will contain a relatively nominal moment force which will, therefore, result in enhanced connection integrity.

30 When the baby bends as if, for example, to pick up an item, the forward portion 11 of the diaper 10 above the

elastic 22 and represented by the dimension "d9" of 3/4" will bend over the tabs 20, 21 which may still be exposed if the infant is large and the diaper 10 is intended for a small infant. Thus, the fabric will cover the tabs 20, 21 and prevent contact of these tabs either the stomach of the infant.

When the diaper 10 is removed from the infant, the process is simply reversed. The diaper 10 may then be washed by simply folding the VELMATE protect tabs 31, 32 over the attachment tabs 23, 24. Thus, no catching action of the tabs with other fabrics or clothing will occur in the washing machine.

A further embodiment according to the invention is illustrated in Figures 6 and 7. In this embodiment, the fastener and cover combination is illustrated generally at 100 and comprises a hook portion 101 and a loop portion 102. The hook portion 101 is sewed to the fabric 103 of the baby diaper 10 about its periphery so that it remains flat and may be attached to the VELCRO tab or loop portion 21 (Figure 4) on the front of the diaper 10.

The loop portion 102 of the further embodiment, however, is separately connected to the fabric 103 also by sewing but is stitched down on only one side, namely that side nearestmost to the hook portion 101. As indicated in Figure 6, there are two hook portions 101 and two complementary loop portions 102, one set being connected to each of the flaps 50, 51, respectively.

In operation, the loop portions 102 are used as fastener covers for the hook portions 101 when, for example, the diaper 10 is washed and it is intended to prevent contaminants from attaching themselves to the hook portions 101. The loop portions 102, being sewed to the fabric 103 only at one side, are biased upwardly and are rotatable

about the connection axis defined by the row of stitching 104. When washing the diaper 10, the loop portion 102 is folded over about axis 104 and pressed against the hook portion 101 which will prevent the attachment of foreign material to the hook portion 101. When the washing operation is terminated, the hook portion 101, being biased away from the fabric 103 is essentially self opening and a minimum amount of removal force is required to separate the loop portion 102 from the hook portion 101.

Yet a further embodiment of the invention is illustrated in Figure 8. Whereas in Figures 1-3, the elastic portions 22, 33, 41, 42 are mounted to the inside of the diaper 10 or, at least, between the two layers of fabric, the embodiment of Figure 8 contemplates that the elastic portions 110, 111, 112, 113 will be mounted on the outside of the diaper 10. Mounting the elastic portions to the outside of the diaper 10 is advantageous since the mounting speeds up the manufacturing process because there is no need to curve the elastic manually prior to attaching it to the fabric material. Rather, the fabric is simply laid flat and the elastic portions 101, 102, 103, 104 are stretched to the desired length and sewed directly to the fabric 103. A further advantage is attaching the elastic portions directly to the fabric 103 on the outside of the diaper 10 is that the infant is separated from the elastic by two layers of fabric 103 rather than one as is the case with the embodiment of Figures 1-3.

In a further embodiment of the invention, there is provided a fastening device using an extruded plastic polymeric material such as nylon or polypropylene, rather than the aforementioned VELCRO material. While VELCRO type woven fabric material is useful for the hook portion of the fastener in many applications, there is a tendency for the fabric of the hook portion to retain foreign material in its interstices, such foreign material being readily available

to the hook portion from washing. The retention of the foreign material reduces and eventually may eliminate the fastening ability of the hook.

5 Yet a further disadvantage of the VELCRO material is that, because of chemicals used in washing diapers, there is a tendency over time for the woven fabric hook portion to harden and break off which reduces the fastening ability of the hooks and results, again eventually, in a hook portion
10 which will not fasten.

In contradistinction, an extruded plastic hook may be used which will replace the aforementioned woven fabric hook portion. The extruded plastic hook portion is much
15 stronger and is substantially uniform over the entire fastening area. Thus, increased fastening integrity can be obtained. Since the hook is extruded, it is cleaner with the result that the aforementioned problems are substantially reduced or eliminated. Finally, such a hook
20 portion is substantially thinner with the result that the bulk of the diaper is reduced.

An extruded plastic material which may be used in replacement of the previous VELCRO hook portion is sold
25 under the trademark ULTRA-MATE and reference is made to Figure 9 where the extruded hook is generally illustrated at 64.

Yet a further embodiment relates to the composition and
30 method of manufacture of the rayon absorbent pad or wear strip 34 illustrated in Figure 3. Although the pad 34 was useful in many instances and particularly so for diapers with relatively short lives, it was found that the pad 34 which had a weight of 12 oz. and was made from 100% natural
35 regenerated rayon, was unacceptably soft with the result that the pad 34 would eventually ball or mat during washing.

In preparing rayon material for the rayon wear pad, a needling or sewing process is used on the material to form the fabric as seen in Figure 11. The needles 52 would pass down through the material 53 from the top surface 54 to the bottom surface 60. The needles 52 then return to the top position originating position. Thus, a rayon pad 34 (Figure 3) would result which would have a width of approximately 84 inches. The top surface 54 would be somewhat firmer than the bottom surface as this is inherent in the sewing process which compresses the top surface 54 to a somewhat greater extent than the bottom surface 60.

To overcome the aforementioned problems with the absorbent pad 34, two layers of fabric 61, 62 (Figure 10) were used, each obtained as is usual from the process shown in Figure 10. However, these two layers of fabric 61, 62 were combined to form a new pad as will be described.

Reference is made to Figure 10 where the two layers 61, 62 are fed into the needling apparatus generally illustrated at 63. The soft sides, that is, the bottom sides 60 in the first sewing process just described, were fed in contact with and facing each other. The combination was then sewed together once again with the result that the top surface of the combination was slightly harder than the bottom surface. An advantage of this process is that the pad 34 will have a soft central portion which allows better fluid distribution. When the combined pad is positioned and sewn into the diaper, the soft side, that is, the bottom side, faces the user and the top side faces outwardly from the user. This allows better wear and increased softness to the user.

It is frequently the case that an infant wearing the diaper 10 will attempt to tug open the wing 14 of the diaper 10 and, in so doing, separate the hook 101 (Figure 6) from the loop 21 (Figure 1) on the forward portion of the diaper 10. It would be advantageous if the force required

to separate the hook 101 and the loop 21 could be increased. To that end, a further embodiment of the invention is illustrated in Figures 12 and 13 and described below.

5 In this further embodiment, the hook 201 (Figure 12) is mounted as illustrated with only an inside section 202 of the whole hook 201 being sewn to the diaper 10 about the periphery of the inside section 202 as indicated. Thus, an
10 outside section 203 of hook 201 is left unattached and this outside section 203 can be readily moved towards and away from the diaper 10. In operation, the hook 201 mounted on the wing 14 of the diaper 10 is attached to the loop 21 on the forward portion of the diaper 10. When the infant,
15 however, begins to tug or pull on the wing 14, the force will not be the previously generally normal force between the hook 201 and the loop 21 as was the case in the earlier embodiments. Rather, the force between the hook 201 and the
20 loop 21 will be that more closely resembling a shear force because the wing 14 will fold over the hook 201 as indicated by the arrows in Figure 13 leaving the outside section 203 still attached to the loop 21. The separation force applied between the hook 201 and the loop 21 will be applied by the force on the wing 14 acting through the attached inside
25 section 202 of the hook 201. The shear force required to separate the outside section 203 of hook 201 still attached to loop 21 will be much greater than the normal force previously required with the result that the infant will not have enough strength to open the diaper and will lose
30 interest in so doing.

30 Similarly, it is desirable for the hook 201 and the loop 200 to maintain their contact during washing so that other fabrics and contamination are not attracted to the hook 201. To that end, a small recess or space 204 having a width of
35 approximately 1/8 inch is located between the hook 201 and the loop 200. The hook 201 again is preferably mounted to the wing portion 14 only partially through the inside

section 202 as previously described. Likewise the loop 200 is preferably attached only along one sew line 210 at one end as indicated in Figure 12 rather than sewing the loop 200 completely around its periphery or, if desired, the sew line 210 can further have added sew lines 211, 212 extending to the inside a short distance from each of the ends of the sew line 210.

In operation and when the diaper 10 is intended to be washed, the hook 201 is folded over the loop 200 with the recess 204 forming a natural fold line as seen in Figures 12 and 14. Again, if there is a tendency for the hook 201 and the loop 200 to separate, a shear force will be required between them rather than a substantially normal force as would otherwise be the case if the hook 201 was mounted to the wing portion 14 of the diaper 10 completely about its periphery as is the case with the embodiment illustrated in Figure 6. Thus, there is a greater tendency for the hook 201 and loop 200 to be maintained in position and remain closed.

In a further embodiment of the invention, the fastener generally illustrated at 300 is used with the diaper 301 as seen in Figures 15 and 16. This fastener 300 is used particularly with industrial use diapers where washing many diapers is commonplace. With such industrial or commercial use, it is inconvenient to cover the hook portion 101 (Figure 6) manually for such a large number of diapers and, therefore, the fastener 300 is used. In this embodiment, the tongue 303 extends from the pocket 304 of the fastener 300 and is mounted within the pocket 304 by an elastic 310 which is connected between the pocket 304 and the end of the tongue 303.

The tongue 303 is the hook portion 302 of the fastener 300 but the outer distance 305 of the tongue 303 which extends from the pocket 304 when the tongue 303 is in its retracted

position is bare and does not contain any hooks. This is so since when the diaper 301 is washed, the hook portion 311 will be wholly or almost wholly within the pocket 304 in its retracted position and will not, therefore, be in a position to attract foreign material or debris when the diaper 301 is being washed.

In operation, when the diaper 301 is worn, the tongue 303 in both pockets 304 will be pulled out of the respective pocket 304 by the base portion or outer distance 305 and will be mated with a complementary loop portion (not shown) on the forward face of the diaper 301 similar to that portion 20, 21 illustrated in Figure 4. When the diaper 301 is removed from the user and is to be washed, the tongue 303 will automatically withdraw into the pocket 304 by the biasing action of the elastic 310. The hook portion 302 of the tongue 303 will be wholly or most nearly wholly within the pocket 304 and, when the diaper 301 is washed, the hook portion 302 will not attract foreign debris or other material.

In forming the pocket 304 within which the elastic 310 is attached, it has been found necessary to make it fairly stiff. To do so, the pocket 304 has been constructed of two pieces of VELCRO material stitched together with the smooth sides forming the inside of the pocket 304. The elastic 310 is sewed to the inside of the pocket 304 which is then stitched to the diaper 301.

While a flat piece of elastic material 310 has been used to create the necessary biasing action, it is clear that anything could be used which creates the necessary force to allow automatic withdrawal of the tongue 303 into the pocket 304 of the fastener 300.

Yet further embodiments of the invention are illustrated in Figures 17 through 19. This embodiment illustrates a

commercial type diaper generally illustrated at 400 and a diaper cover generally illustrated at 401. The commercial diaper 400 is so called since it is washed so frequently that minimal maintenance functions are required to sustain the diaper in its useable condition. Thus, any material must have very long longevity in its use and such actions as folding the attachment tabs prior to washing must be dispensed with since commercial operators will be using the diaper 400.

Referring initially to Figures 17A and 17B, the diaper cover 401 includes a forward portion 402 and a rearward portion 403 which, in fact, are a single piece. The outside of the diaper cover 401 is made from an elasticized cotton material 404 which has a waterproof rubberised material 410 attached thereto on the inside. A web like material 411, only a small portion of which is illustrated in Figure 17A is attached over the rubberised inner material 410 to allow air circulation throughout. It extends over the entire inner face of the diaper cover 401.

Two VELCRO (Trademark) attachment rectangles 412, 413 are mounted on the tabs 414, 420 of the diaper cover 401. The hook portions of the VELCRO are mounted on the tabs 412, 413 of the inside of the diaper cover 401 and the loop portion 421 is a single large piece on the outside of the forward portion 402 as seen clearly in Figure 17B. This allows the attachment rectangles 412, 413 to be quickly and easily secured to the loop portion 421 when the diaper cover 401 is being worn over a diaper 400.

Two ribbons 422, 423 are connected to the inside of the diaper cover 401 adjacent or on the tabs 414, 420. They extend substantially across the tabs 414, 420 as illustrated and are attached only at their ends 424, 430 by sewing, for example. Thus, the area of the ribbons 422, 423 between the

ends 424, 430 is not attached and is used for holding the diaper 400 as will be explained in greater detail hereafter.

5 Three elastic pieces 431, 432, 433, respectively, are sewn into the material of the diaper cover 401 as illustrated, one piece 431 being on the rearward portion 403 of the diaper cover 401 and one piece 432, 433 being on the sides of the diaper cover 401 which is intended to create a more secure fit between the legs of the user and the diaper
10 cover 401. In an alternative construction, a pair of flange pieces (not shown) are inserted between the loop portion 421 and the ribbons 422, 423 and the elastic is mounted on the outside of the flange pieces. The flange pieces act to create a pocket or reservoir which creates a better seal
15 integrity between the diaper cover 401 and user.

The diaper 400 is generally illustrated in Figures 18A and 18B. It is made from five different pieces of cotton material. The centre piece 434 is tapered and extends from
20 the front 435 of the diaper 400 to the back 440 of the diaper 400. It is constructed of four layers of cotton material or, alternatively, two layers of cotton material and a polyrayon pad which is mounted between the cotton. Alternatively, of course, different material could be used
25 for the pad such as felt or rayon or cotton so long as the desired absorbency was obtained. Two leg pieces 441, 442 are connected to the centre piece 434, each being sewn along a respective connection seam 443. The length 460 of the leg pieces 441, 442 along the connection seam 443 is
30 curved and longer than the length 461 of the centre piece 434. The length 461 of the centre piece 434 along the connection seam 443 tends to follow the curved shape of the leg pieces 441 along the connection seam 443. Thus, a cup shape is formed as is clearly seen in Figure 18B. This cup
35 shape is advantageous and forms a "reservoir" to act to retain any material and prevent leakage.

The leg pieces 441, 442 extend at the back 440 of the diaper 400 into flaps 444, 450. The flaps 444, 450 are truncated at the connection hinge 451 and a further piece of material 452, 453 is sewn to the end of the flaps 444, 450 along the connection hinge 451. They are sewn together at the connection hinge 451 while the two pieces are overlaid so that it is natural for the material pieces 452, 453 to overlay the flaps 444, 450 of the leg pieces 441, 442 in a "self closing" relationship and serve a purpose as defined in greater detail hereafter and as shown in Figure 19.

In operation, the diaper 400 is mounted to the diaper cover 401 as is illustrated in Figure 19 by sliding the flaps 444, 450 under the ribbons 422, 423 and folding each ear piece 452, 453 of the flaps 444, 450, respectively, over its respective ribbon 422, 423, respectively. This will retain the diaper 400 within the diaper cover 401 and allow for easy removal of the diaper 400 from the diaper cover 401 when washing is required.

Since each diaper cover 401 is preferably designed for use with a number of different sized diapers 400, the points of ribbon attachment to the diaper cover 401 may change depending upon the size of the flaps 444, 450 so that a secure retention is achieved and so that the diaper 400 will properly be positioned on the user. For example, and referring to Figure 19, the ribbons 421, 422 may be tacked at 445 for a diaper 400 of a first size. If the size of the diaper 400 increases, then the tack 445 is removed and a new tack 446 is inserted. This is useful as the infant grows into larger sized diapers and diaper covers so that a particular diaper cover may be used as long as possible for increased sizes of diapers.

An advantage of the two leg pieces 441, 442 being used to join with the centre piece 434 is that the marker shown more clearly in Figure 20 is most useful since the material can

be cut easily. Two layers of cotton material are required for each of the leg pieces 441, 442 while four layers of cotton material are required for the centre piece 434. The added material pieces 452, 453 are also illustrated in Figure 20 as being cut from the same material. Thus, when the material 455 is cut and four centre pieces 434 are obtained, a pair of double layer leg pieces 441, 442 and double pieces of the added material 452, 453 are also obtained from the same material 455. Any additional material left from the cutting of the material used for the diaper 400 may be used for other cutting purposes, such as breast pads for nursing mothers for example, which are also made from absorbent cotton material.

Referring now to Figure 21, a proposed construction for the diaper 400 is illustrated. It comprises of at least three layers of material. One outside layer 452 comprises 100% cotton material and the opposite outside layer 453 is 100% polyester sheeting. The third layer 454, sandwiched between the two outside layers 452, 453, is made from a poly/rayon blend material 454. A fourth layer 460, if desired, could also be used in which event it is preferably also cotton material.

In use, the diaper 400 of Figure 21 can be used with either the cotton layer 452 or the polycotton layer 453 adjacent the baby. This diaper 400 has a "stay dry" liner aspect to its operation. For example, the polycotton layer 453 will allow moisture to pass therethrough and this moisture is readily absorbed by the polyrayon blend 454 which will hold the moisture and will not readily release it. Thus, the mother can decide which layer of material she would prefer be located next to the infant and the diaper 400 can be accordingly mounted within the diaper cover 401.

Many dimensions have been disclosed which have been formed to be appropriate for an infant of normal size. Clearly,

however, such dimensions may be amended or modified depending on the particular size of the infant on which it is intended to position the diaper.

5 While specific embodiments of the invention have been described, such embodiments are illustrative of the invention only and should not be taken as limiting its scope. Many further modifications will readily occur to those skilled in the art to which the invention relates
10 which should be construed in accordance with the accompanying claims.

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WHAT IS CLAIMED IS:

1. A diaper for an infant comprising a forward portion, a rearward portion connected to said forward portion, attachment means positioned on opposite sides of said forward and rearward portions and expansion means positioned between said forward portion between said attachment means on said forward portion.
5
2. A diaper as in claim 1 wherein said attachment means are tabs, two of said tabs being located on opposite sides of said rearward portion and two of said tabs being located on opposite sides of said forward portion, said expansion means being located between said tabs on said forward portion.
10
15
3. A diaper as in claim 2 wherein said tabs are VELCRO and said expansion means is elastic.
4. A diaper as in claim 3 wherein said tabs are located a distance of approximately 3/4" below the upper side of said forward portion.
20
5. A diaper as in claim 4 wherein said elastic portion is located substantially centrally between said tabs on said forward portion.
25
6. A diaper as in claim 5 wherein said forward portion includes flaps extending outwardly from said tabs mounted on said forward portion.
30
7. A diaper as in claim 6 and further comprising an elastic portion in said rearward portion, said elastic portion in said rearward portion being positioned substantially centrally of said tabs on said rearward portion.
35

8. A diaper for an infant comprising a forward portion, a rearward portion and expansion means mounted in the central portion of said forward and rearward portions, said expansion means being under a predetermined tension such that said diaper forms a cup shape in its non-fitted position.
9. A diaper as in claim 8 wherein said expansion means comprises elastic material, one of said elastic material being located on one side of said central portion and the other of said elastic material being located on the opposite side of said central portion.
10. A fastener cover for a diaper comprising a first hook portion mounted to the fabric of said diaper about the periphery of said hook portion, a second loop portion mounted separately from and adjacent to said hook portion, said loop portion being connected to said fabric along a connection axis on one side of said loop portion nearestmost to said hook portion, said second loop portion being operable to rotate about said connection axis to cover and connect with said hook portion.
11. A fastener cover as in claim 10 wherein said diaper has respectively oppositely located flap portions, one of said hook and loop portions being mounted on each of said flap portions.
12. A diaper comprising at least two layers of fabric material and a plurality of elastic portions to conform the shape of said diaper more closely to the shape of the user of said diaper, at least one of said elastic portions being connected to said diaper and contacting only the outside surface of said two layers of fabric.

13. A diaper as in claim 12 wherein said elastic members are mounted a predetermined distance inside the periphery of said diaper.
- 5 14. A diaper comprising a forward portion, a rearward portion connected to said forward portion, attachment means positioned on opposite sides of said forward and rearward portions, said attachment means comprising a loop portion on the forward portion of said diaper and a
10 hook portion on the rearward portion of said diaper, said hook portion being made from an extruded plastic material and being operable to contact and fasten to said loop portion.
- 15 15. A diaper as in claim 14 wherein said extruded hook portion is made from a polymer material.
16. A diaper as in claim 15 wherein said polymer material is nylon or polypropylene.
20
17. A diaper as in claim 16 wherein said hook portion is an ULTRA-MATE hook portion.
- 25 18. An absorbency pad for a diaper comprising a first layer of needled fabric material having a first side in which the needle has entered said material and a second side in which the needle has penetrated from said first side, said pad further having a second layer of needled fabric material having a first side in which said needle
30 has entered said material and a second side in which said needle has penetrated from said first side, said second side of said first layer being connected to said second side of said second layer.
- 35 19. An absorbency pad as in claim 18 wherein said first and second layers form a combination, said combination being needled by needles entering said combination from one

side of said combination and penetrating the opposite side of said combination from said one side.

- 5 20. A method of constructing an absorbent pad comprising the steps of positioning a first piece of fabric material having first and second sides in contact with a second piece of fabric material having first and second sides, said second sides being in contact, said first side of each of said pieces of material being the side entered
10 initially by the needles in a sewing process.
- 15 21. A method as in claim 20 and further comprising sewing said first piece of fabric material to said second piece of fabric material.
- 20 22. A method as in claim 21 and further comprising sewing the combination of said first and second pieces of fabric material to a diaper having an outer face facing away from the user, said combination having a first side in which the needles entered during the sewing process, said first side facing in the same direction as said outer face of said diaper.
- 25 23. A diaper comprising a forward portion, a loop section connected to said forward portion, a rearward portion connected to said forward portion, said rearward portion including a wing extending outwardly on each side of said rearward portion and being operable to be positioned over said loop section of said forward
30 portion, a hook mounted on each of said wings, said hook comprising an inside and an outside section, said inside section being connected to said rearward portion of said diaper and said outside section not being attached to said rearward portion of said diaper.
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24. A diaper as in claim 23 wherein said inside section is attached to said rearward portion of said diaper by sewing about its periphery.
- 5 25. A diaper as in claim 24 and further comprising a loop mounted on said rearward portion inwardly of said hook, said hook being foldable over and removably connected to said loop.
- 10 26. A diaper as in claim 25 wherein a recess is positioned between said hook and said loop, said recess being operable as a fold line when said hook is foldable over and removably connected to said loop.
- 15 27. A diaper comprising a forward portion, a rearward portion connected to said forward portion and including a wing extending outwardly on each side of said rearward portion, a hook and a loop mounted adjacent to each other on each of said wings, each of said hooks being
20 operable to fold over each of said loops, each of said loops being mounted inside each respective hook and a space between each of said hooks and respectively
25 mounted loops, said space being operable as a fold line when each of said hooks is folded over said respective loop.
28. A diaper as in claim 27 wherein said loop is partially attached to said diaper.
- 30 29. A diaper as in claim 28 wherein said loop is partially attached to said diaper by sewing.
30. A diaper as in claim 29 wherein said loop is attached to said diaper with a single sew line located adjacent to
35 said hook.

- 5 31. A diaper as in claim 30 wherein each of said hooks comprises an inside and an outside section, said inside section being connected to said rearward portion of said diaper and said outside section being connected to said inside section and not being attached to said diaper.
- 10 32. A fastener for a reusable diaper having forward and rearward portions, said fastener being operably mounted on sides of said rearward portion of said diaper, said fastener comprising a pocket and a tongue movable between extended and unextended positions and mounted within said pocket, said tongue being biased so as to return to said pocket in said unextended position.
- 15 33. A fastener as in claim 32 wherein said tongue has a fastening portion and a vacant portion, said vacant portion extending from said pocket and said vacant portion being substantially wholly within said pocket in said unextended position of said tongue.
- 20 34. A fastener as in claim 33 wherein said tongue is biased by elastic.
- 25 35. A fastener as in claim 33 wherein said fastening portion is hook material.
- 30 36. A diaper cover for a reusable diaper comprising a rearward portion, a forward portion attached to said rearward portion, tabs extending outwardly from opposite sides of said rearward portion, means for attaching said tabs to said forward portion and means for retaining a diaper in said diaper cover.
- 35 37. A diaper cover as in claim 36 wherein said diaper retaining means are mounted to said tabs.

38. A diaper cover as in claim 37 wherein said diaper retaining means are ribbons for retaining the flaps of a complementary diaper mounted within said diaper cover.
- 5 39. A diaper cover as in claim 38 wherein said flaps are retained by said ribbons by folding over said ribbons.
- 10 40. A diaper comprising a forward portion, a rearward portion connected to said forward portion, a leg piece having a curved periphery and being connected on opposite sides of said forward and rearward portions along a connection seam having a first length, the length of said curved periphery of said leg piece along said connection seam being of a second length, said
15 second length being longer than said first length so that a cup shape is formed by said forward and rearward portion in the central area adjacent said connection seam between said forward and rearward portions and said leg pieces.
20
41. A diaper as in claim 40 wherein said connection seams extend substantially the length of said diaper between said forward and rearward portions.
- 25 42. A diaper comprising a forward portion, a rearward portion connected to said forward portion, flaps extending outwardly on both sides of said rearward portion for being retained within a diaper cover, said flaps having a hinge line wherein the most outwardly
30 portion of said flap is foldable over the more inwardly portion of said flap.
- 35 43. A diaper as in claim 42 wherein said flaps are made from two different pieces of material, said material pieces being connected together along said hinge line.

44. A diaper as in claim 43 wherein said material pieces are sewn together along said hinge line.

5 45. A diaper comprising two outside layers of material and at least one inside layer of material, one of said outside layers of material being cotton, the other of said outside layer being polyester sheeting and the inside layer being a polyrayon blend material.

10 46. A diaper as in claim 45 wherein said one outside layer is 100% cotton material.

15 47. A diaper as in claim 46 wherein the other of said outside layers is 100% polyester sheeting.

48. A diaper as in claim 47 and further comprising a second cotton layer adjacent said inside layer and inside said outside layer.

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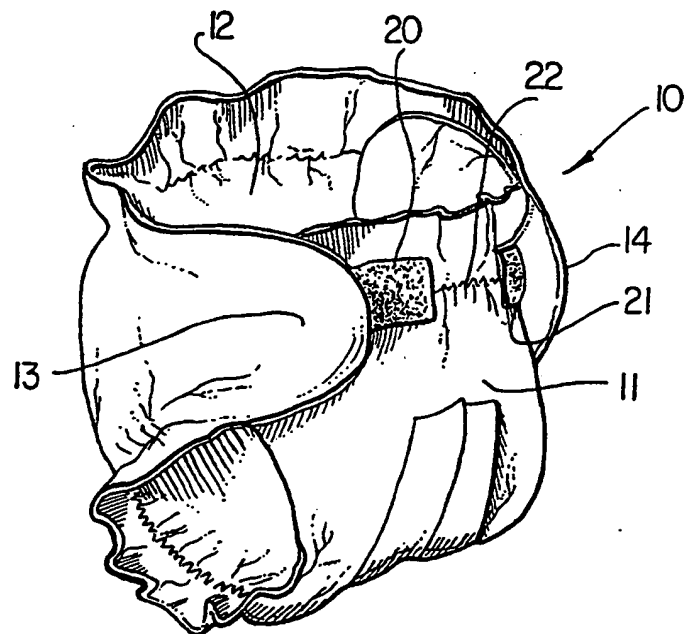


FIG. 1

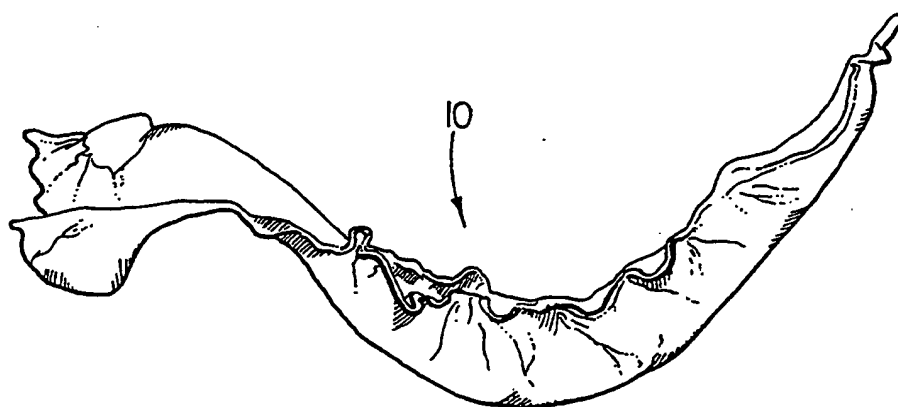
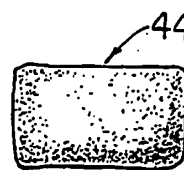
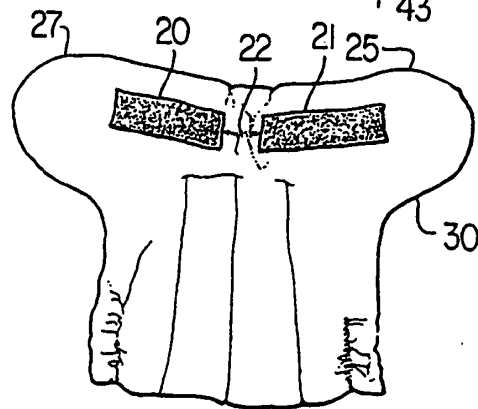
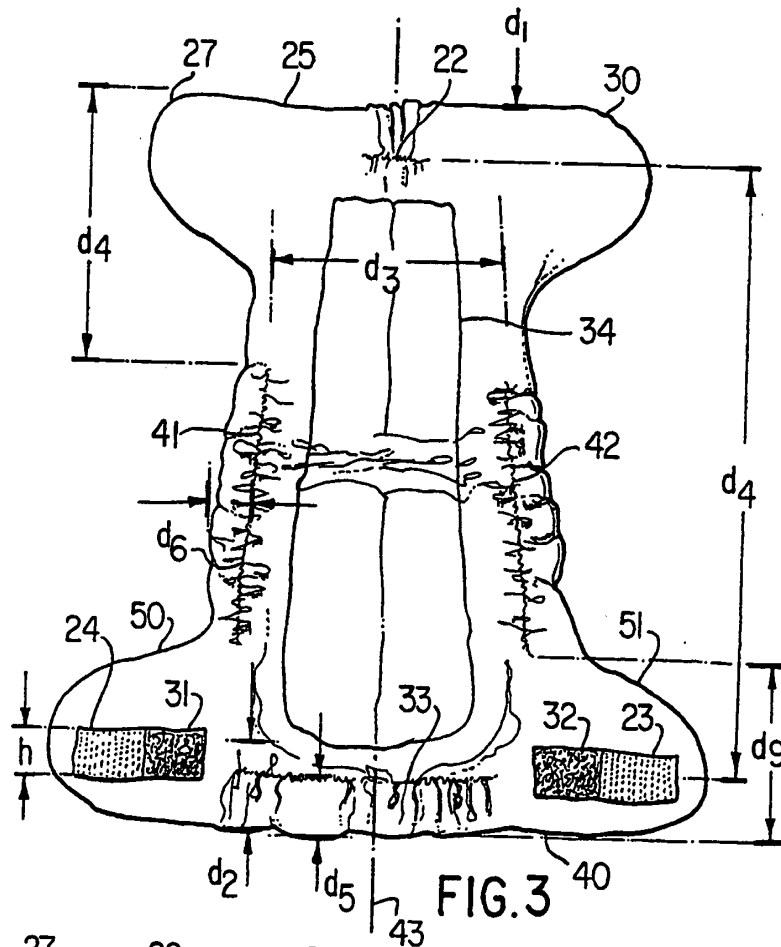


FIG. 2



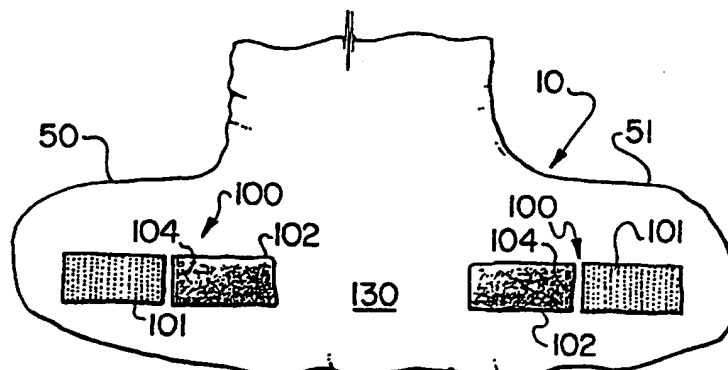


FIG. 6

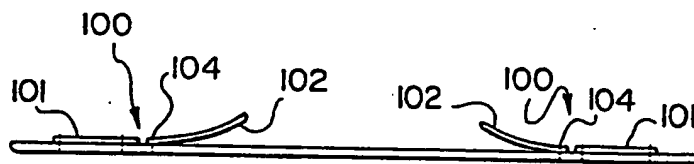


FIG. 7

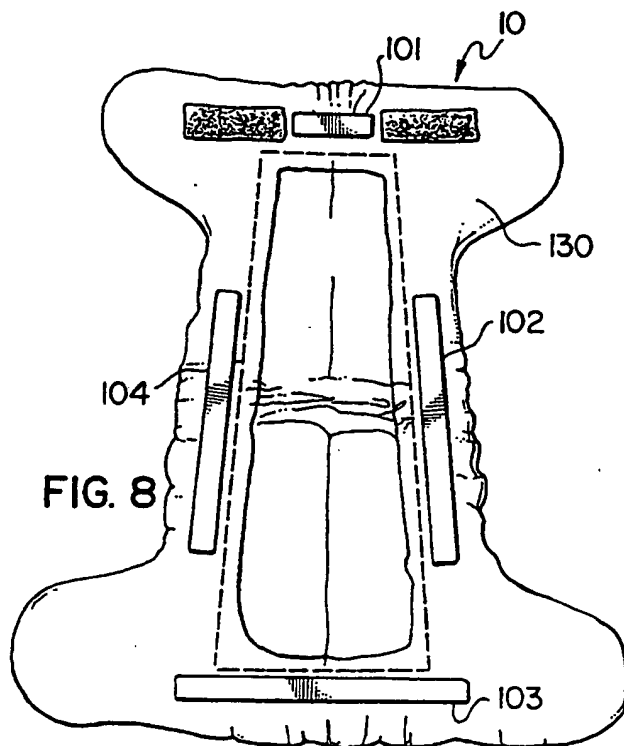


FIG. 8

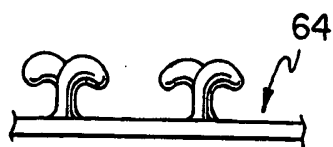


FIG. 9

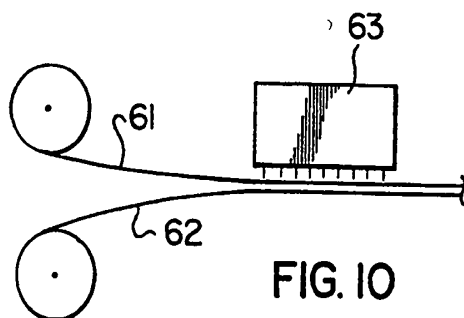


FIG. 10

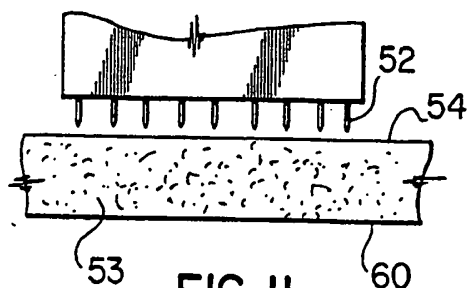


FIG. 11

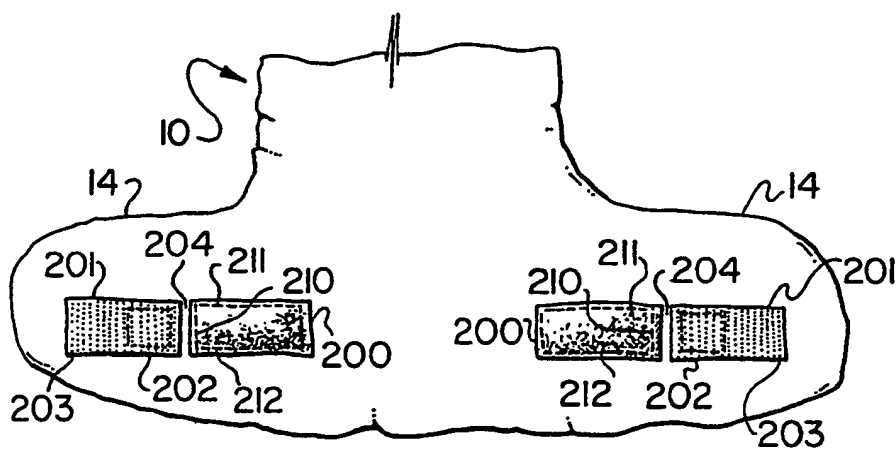


FIG. 12

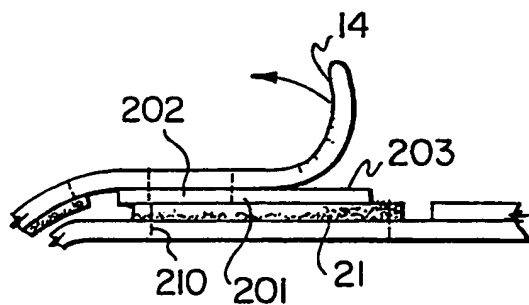


FIG. 13

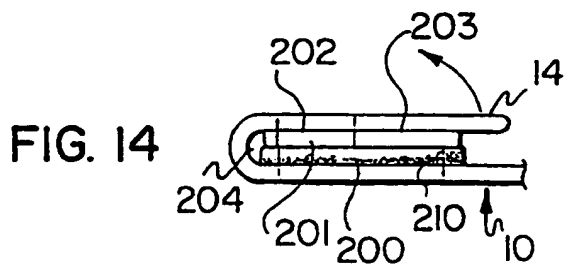
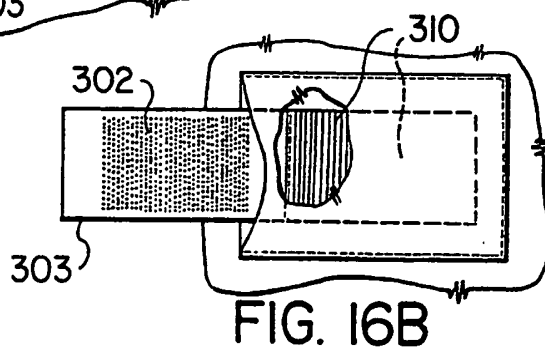
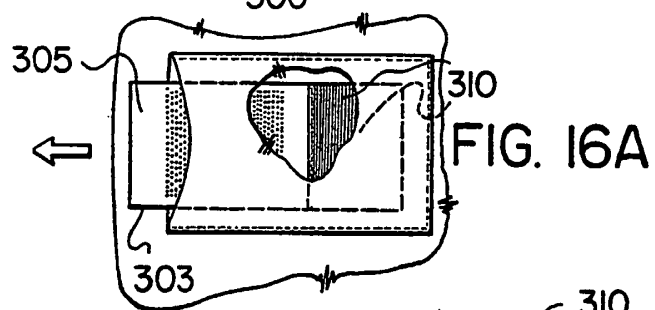
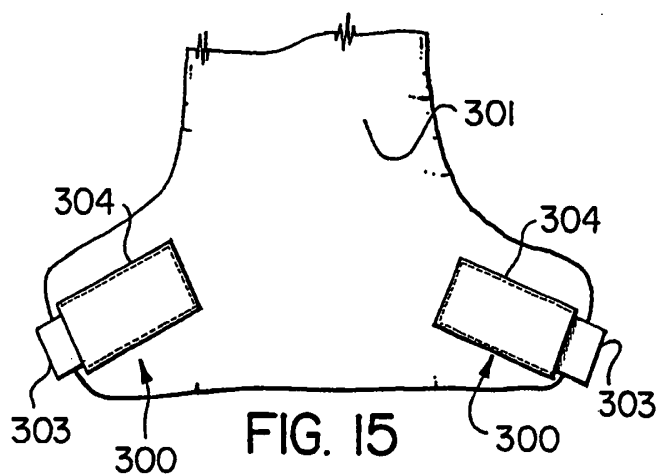


FIG. 14



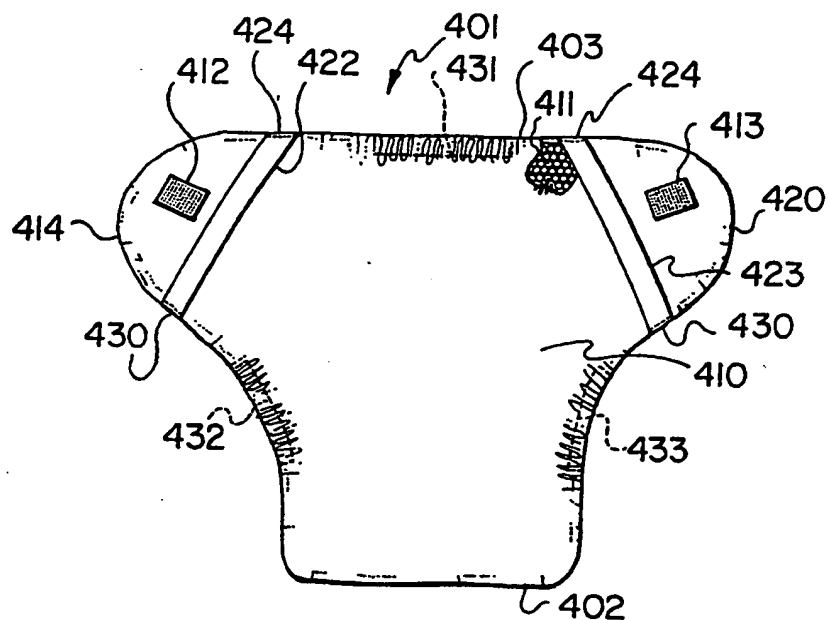


FIG. 17A

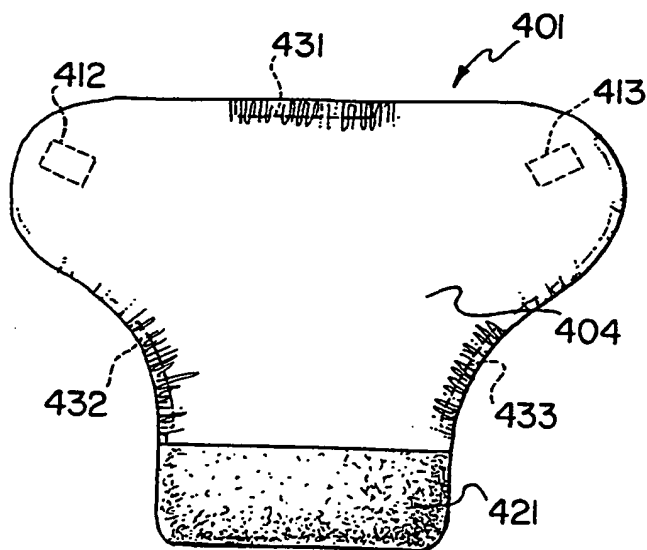


FIG. 17B

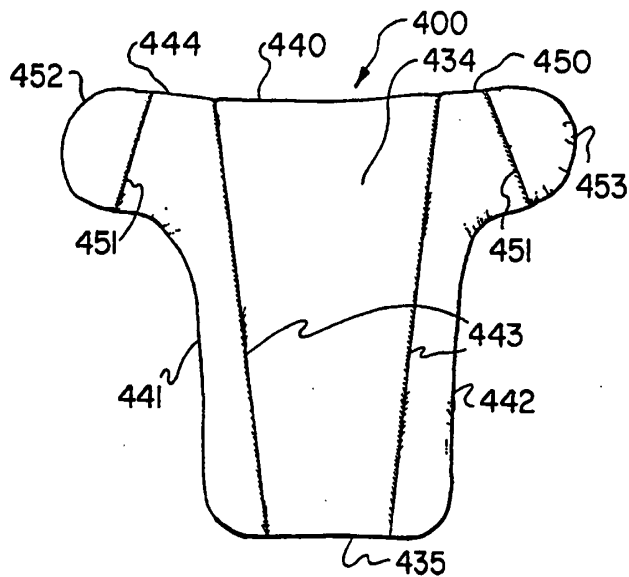


FIG. 18A

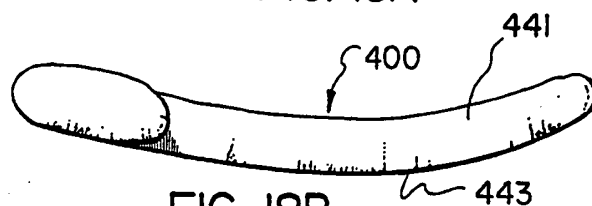


FIG. 18B

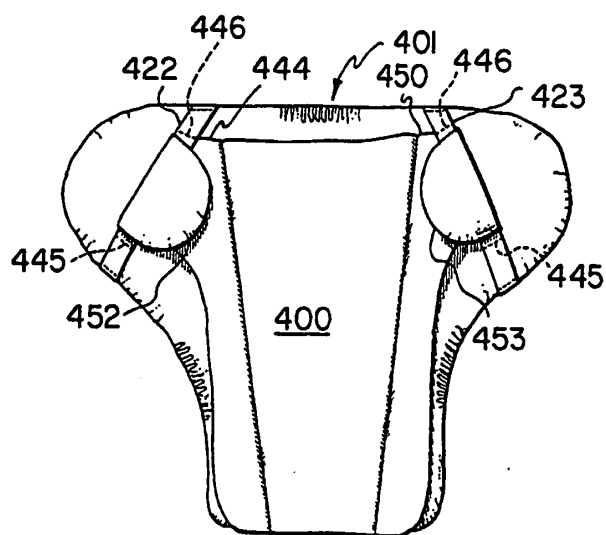


FIG. 19

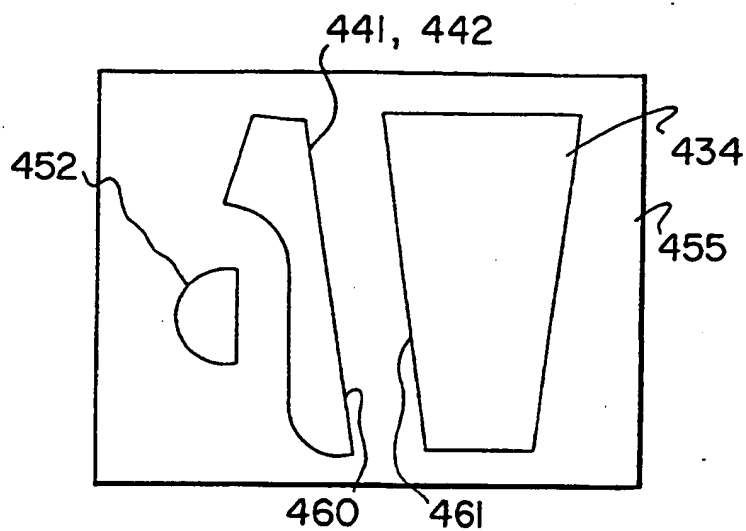


FIG. 20

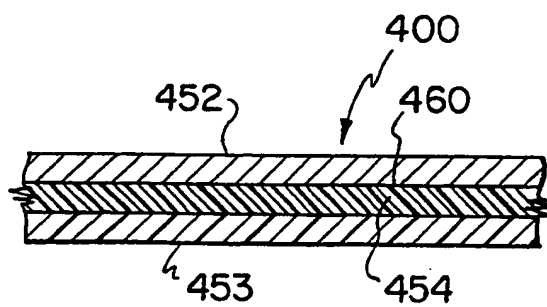


FIG. 21

INTERNATIONAL SEARCH REPORT

International Application No PCT/CA 90/00008

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: A 61 F 13/15, 13/62

II. FIELDS SEARCHED

Minimum Documentation Searched *

Classification System :

Classification Symbols

IPC5 A 41 B; A 61 F

Documentation Searched other than Minimum Documentation
to the extent that such documents are included in the Fields Searched *

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
X	GB, A, 2095561 (COLGATE-PALMOLIVE COMPANY) 6 October 1982, see figure 6	1, 12, 13
Y	see the whole document	1-7
	--	
X	SE, B, 450454 (MÖLNLYCKE AB) 29 June 1987, see page 13, line 16 - line 17; figure 5	1
Y	see the whole document	1-7
	--	
Y	US, A, 4773906 (SHARON KRUSHEL) 27 September 1988, see the whole document	1-7
X		27
	--	

* Special categories of cited documents: 10

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search

23rd March 1990

Date of Mailing of this International Search Report

10. 04. 90

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

L. ROSSI

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
Y	US, A, 4704117 (DEBRA J. MITCHELL) 3 November 1987, see column 3, line 14 - line 39; column 4, line 14 - line 17; claim 1	1-7
X	the whole document against claims 1-7	8-11, 45-47
	--	
Y	DK, B, 154322 (COLGATE-PALMOLIVE COMPANY) 7 November 1988, see figure 1	10, 11
	--	
Y	US, A, 4680030 (COATES ET AL) 14 July 1987, see the whole document	1-7
X		42-44
	--	
Y	US, A, 4568342 (CULLEY W. DAVIS) 4 February 1986, see the whole document	1-7
X		42-44
	--	
X	US, A, 4650483 (FREDERICK M. JOFFE) 17 March 1987, see figures 1, 5	8, 9, 36, 37
Y		2-7
	--	
X	EP, A2, 0276970 (THE ROCTER & GAMBLE COMPANY) 3 August 1988 see the whole document	14-16
	--	
X	EP, A2, 0151018 (JOHNSON & JOHNSON) 7 August 1985 see the whole document	18-22
	--	

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This International Searching Authority found multiple inventions in this international application as follows:

The subjects, defined by the problems and their means of solution as listed below, are so different from each other that no technical relationship or interaction can be appreciated to be present so as to form a single general inventive concept.

- Invention 1: Claims 1-7. A diaper comprising expansion means positioned
1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
 2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☒ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED

between attachment means on a forward portion.

Invention 2: Claims 8,9,12 and 13. A diaper comprising expansion means such that the diaper form a cup shape.

Invention 3: Claims 10-11 and 27-31. A fastener cover comprising a first hook portion and a second loop portion and a diaper comprising such fastener cover.

Invention 4: Claims 14-17. A diaper comprising a hook portion made from an extruded plastic material.

Invention 5: Claims 18-22. A absorbency pad and a method of constructing an absorbent pad.

Invention 6: Claims 23-26. A diaper comprising a hook mounted on the rearward portion, said hook comprising an inside and an outside section, where said outside section not being attached to said rearward portion.

Invention 7: Claims 32-35. Fastener comprising a pocket.

Invention 8: Claims 36-39. A diaper cover.

Invention 9: Claims 40-41. A diaper with leg piece having a curved periphery and according to claims 42-44 foldable flaps.

Invention 10: Claims 45-48. A diaper comprising layers of different material.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/CA 90/00008**

SA 33287

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EIPP file on 28/02/90.
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82